Naval STEM Forum

Freshman Research Initiative (FRI)

National Math and Science Initiative (NMSI)

Advanced Placement Training and Incentive Program (APTIP)

Initiative for Military Families (IMF)

UTeach

The Freshman Research Initiative

The University of Texas at Austin

Education and Success through Research

FRI
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Our Model

- Targets minority students
- Changes lives
- Increases Retention in STEM
- Improves Learning
- Inspires Creativity

This research lab is a classroom, this classroom is a research lab.

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FRI Course Sequence & Timeline

Freshman

Fall

Preparation

- **Research Methods**
  - ✓ Intro to Research and Analysis
  - ✓ Stream Selection
  - ✓ Counts as Signature Course

Spring

Research Stream

- **Intro to Stream Lab Techniques**
  - ✓ Begin Research
  - ✓ Counts as a Lower Division Lab Course

Summer *

- **Optional Summer Research Fellowship**
  - ✓ Summer School Credit
  - ✓ Headstart on Fall Research

Sophomore

Fall

- **Upper Division Stream Research**
  - ✓ Credit for Independent Research
  - ✓ Expand and Complete Stream Project
  - ✓ Counts as Upper Division Lab Course

Spring*

Transition

- **Research Publication & Presentation**
  - ✓ Mentor Research Methods
  - ✓ Join faculty labs, REUs, internships

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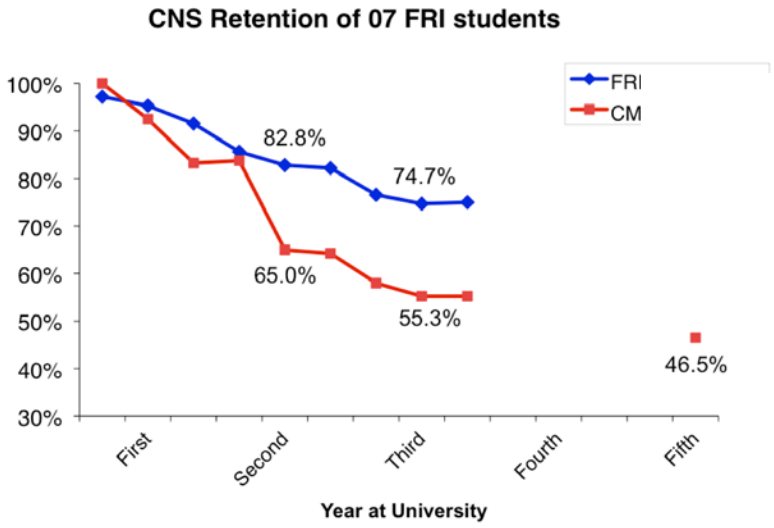
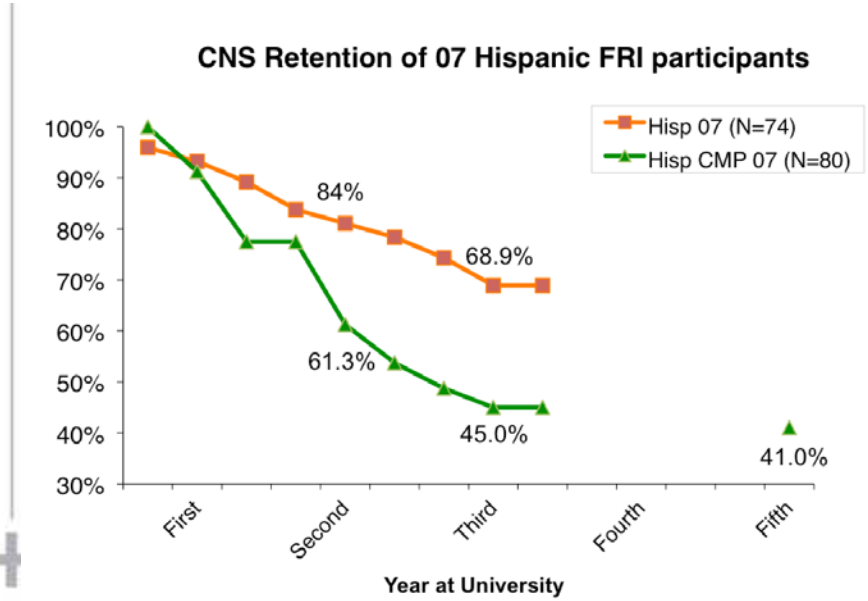
2009-2010 FRI Research Stream Offerings

(21 Streams)

Research Stream Name	Faculty Leader(s)	Discipline(s)	#	1st Spring
Vertebrate Interactome Mapping	Scott Stevens	Molecular Biology	35	2006
Aptamer Selection	Andy Ellington	Biochemistry / Biology	35	2006
Nanomaterials for Chemical Catalysis	Stevenson/Vanden Bout/Crooks	Chemistry	30	2006
Supramolecular Sensors	Eric Anslyn	Chemistry	30	2007
Biobricks	Karen Browning	Biochemistry	35	2007
Discovery Lab in Plant Biology	Stan Roux	Biology	28	2007
Autonomous Vehicles	Peter Stone	Computer Science	15	2007
Computational Intelligence in Game Design	Risto Miikkulainen	Computer Science	20	2007
Frontiers of Liner Algebra Library Dev.	Robert van de Geijn	Mathematics/Computer Science	5	2007
Viral Evolution	Jim Bull	Biology	35	2008
Mitochondrial Gene Expression	Dean Appling	Biochemistry / Molecular Biology	35	2008
Virtual Drug Screening	Jon Robertus	Biology/Computer Science	30	2008
Computational Nanoparticles	Graeme Henkelman	Chemistry/Computer Science	25	2008
Electronic and Magnetic Materials Research	John Markert	Physics	15	2008
Peptide Mimics to Study Binding Energetics	Stephen Martin	Chemistry	33	2009
New Functional Materials & X-Ray Crystallography	R. Jones, B. Holliday	Chemistry	25	2009
Functional Genomics	Vishwanath Iyer	Biology	35	2009
Cell Fate Regulation	Alan Lloyd	Biology	35	2009
The Search for Dark Matter	Don Winget	Astronomy	8	2009
Computational Biology: Studying Disease Dynamics	Wilke /Meyers	Biology/Computer Science	25	2009
Special Topics in Math Research	Ron Hadani	Mathematics	15	2010

FRI Impact on Retention in STM degrees





College of Natural Science (CNS) retention data for the FRI07 cohorts and associated comparison group, plotted over a five year period so that the average CNS five-year retention data can be shown in comparison.

30-35% increase in graduation rates

	% Hispanic
Texas population (est. US Census Bureau)	36.9%
UT Austin entering freshman class	20.7%
CNS entering freshman class	22.8%
FRI Cohort	26.5%

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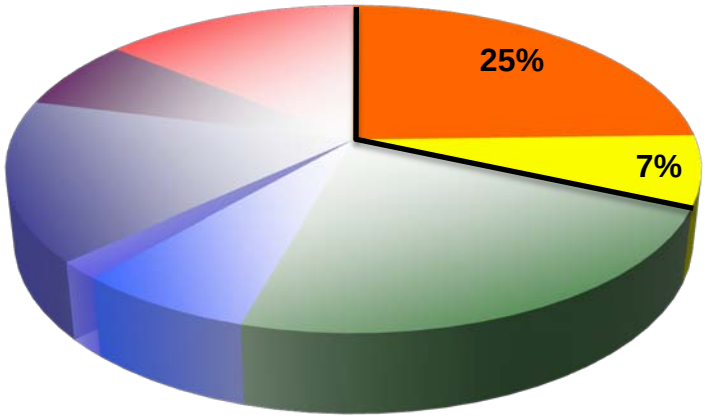
2006 FRI Science Graduates going to Graduate School

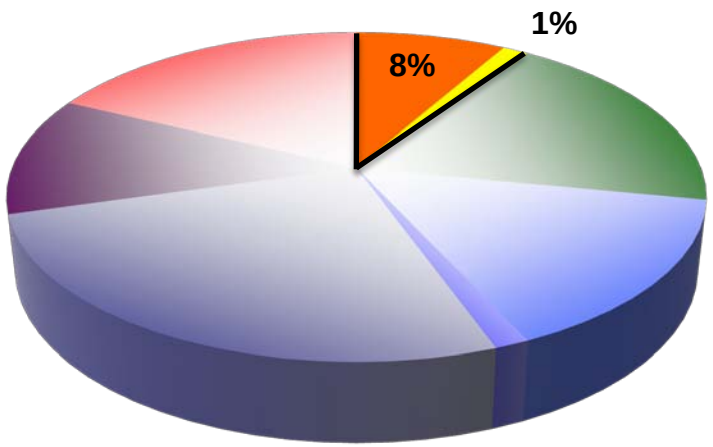
32% FRI students



FRI06 CNS non-honors graduates (N=57)

- Graduate school
- MD/PhD,MPH
- Medical School
- Allied Health Prof
- Other (JD, MBA, etc)
- Applying for schools
- Job, Job search
- Unknown

9% comparison group



CMP06 CNS non-honors graduates (N=146)

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More science is produced

	Number of papers	*Papers on stream research*	*Number of student authors*	*Number of Risk student authors*	*Number of Risk student authors other than strictly female*
In preparation	12	8	16	8	3
Submitted	4	4	23	21	11
In press	4	4	11	6	3
Published	31	18	44	24	9
Total	**50**	**33**	**94**	**59**	**26**

Annual Report 2010: Cumulative (2005-2010) list of refereed journal publications co-authored by FRI student participants

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National Math and Science Initiative

NMSI's Mission:

- The National Math and Science Initiative is an agent of change focused on addressing the national STEM crisis.

NMSI Approach:

- NMSI takes proven programs with quantifiable results to national scale: APTIP, UTEACH, and Initiative for Military Families.
- Our programs impact both the existing and the future teacher cores.

Advanced Placement Training and Incentive Program

INCENTIVES

NMSI selected APTIP for national replication because it produces dramatic achievement gains in rigorous math and science courses

Program Demand

In 2007, non-profits from 28 states applied to replicate the APTIP program. NMSI selected non-profit partners in 6 states for five-year funding and NMSI program management support.

Program Expansion

NMSI is replicating APTIP in Alabama, Arkansas, Connecticut, Kentucky, Massachusetts, and Virginia. To sustain long term improvement in math and science education in their public schools, NMSI's state affiliates have built extensive coalitions with strong support from leaders in business, state government, education, and their communities. NMSI is actively working to find partners to bring the APTIP program to Colorado, Indiana, Michigan and Minnesota.

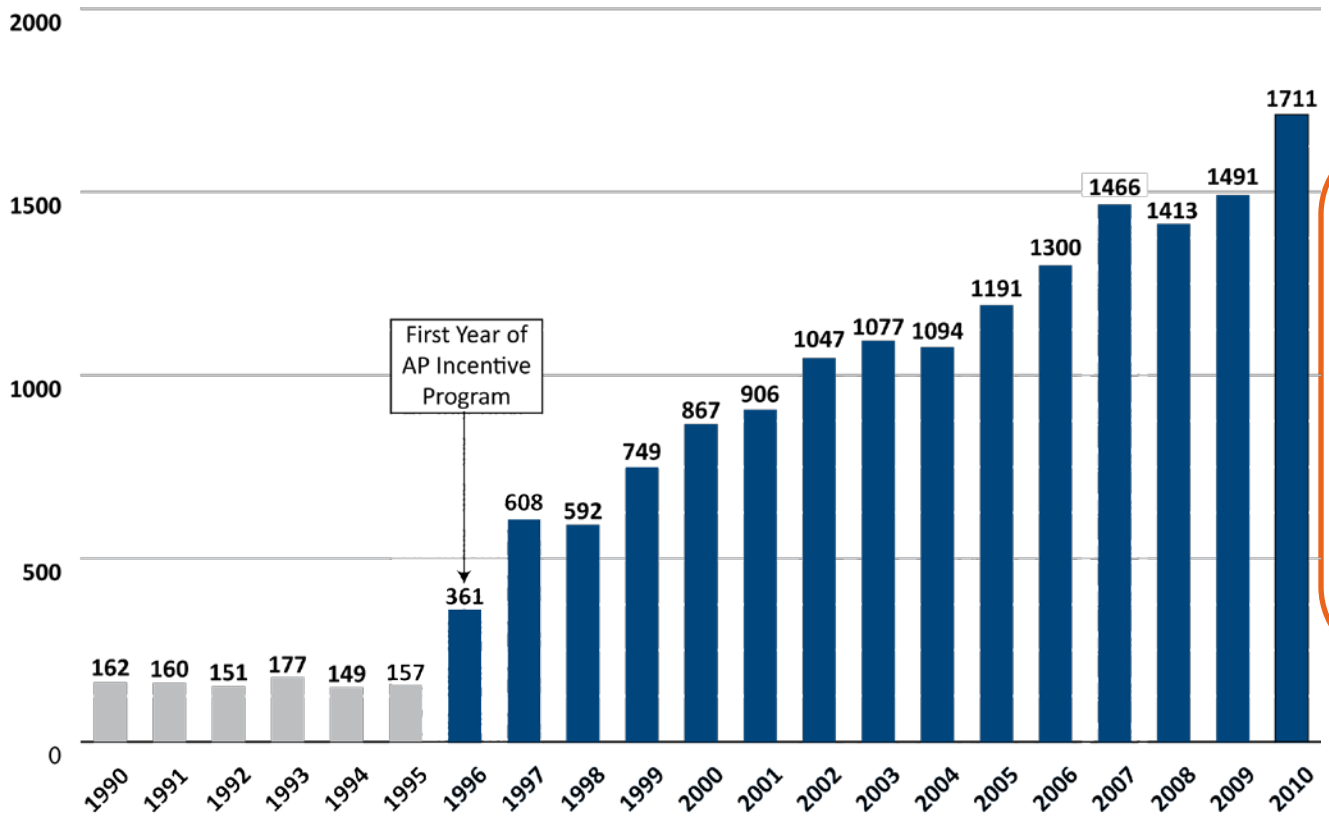
Program Implementation

Implementation began during the 2008 – 2009 school year and will expand to include a new cohort of public high schools each year over the five-year grant period. In 2008 – 2009, NMSI affiliates implemented the APTIP program in 67 public high schools. NMSI is currently implementing APTIP in 229 high schools and plan to reach 350 high schools by fall 2012.

APTIP has a significant track record of improving student achievement.

APTIP replicates a program that began in 10 Dallas ISD schools in 1996 and it continues to produced dramatic results.

AP exams **passed** in math, science, and English in 10 DISD incentive schools



AP passing scores in math, science and English have **increased 11 times** in 15 years in participating DISD schools.

Source: The College Board

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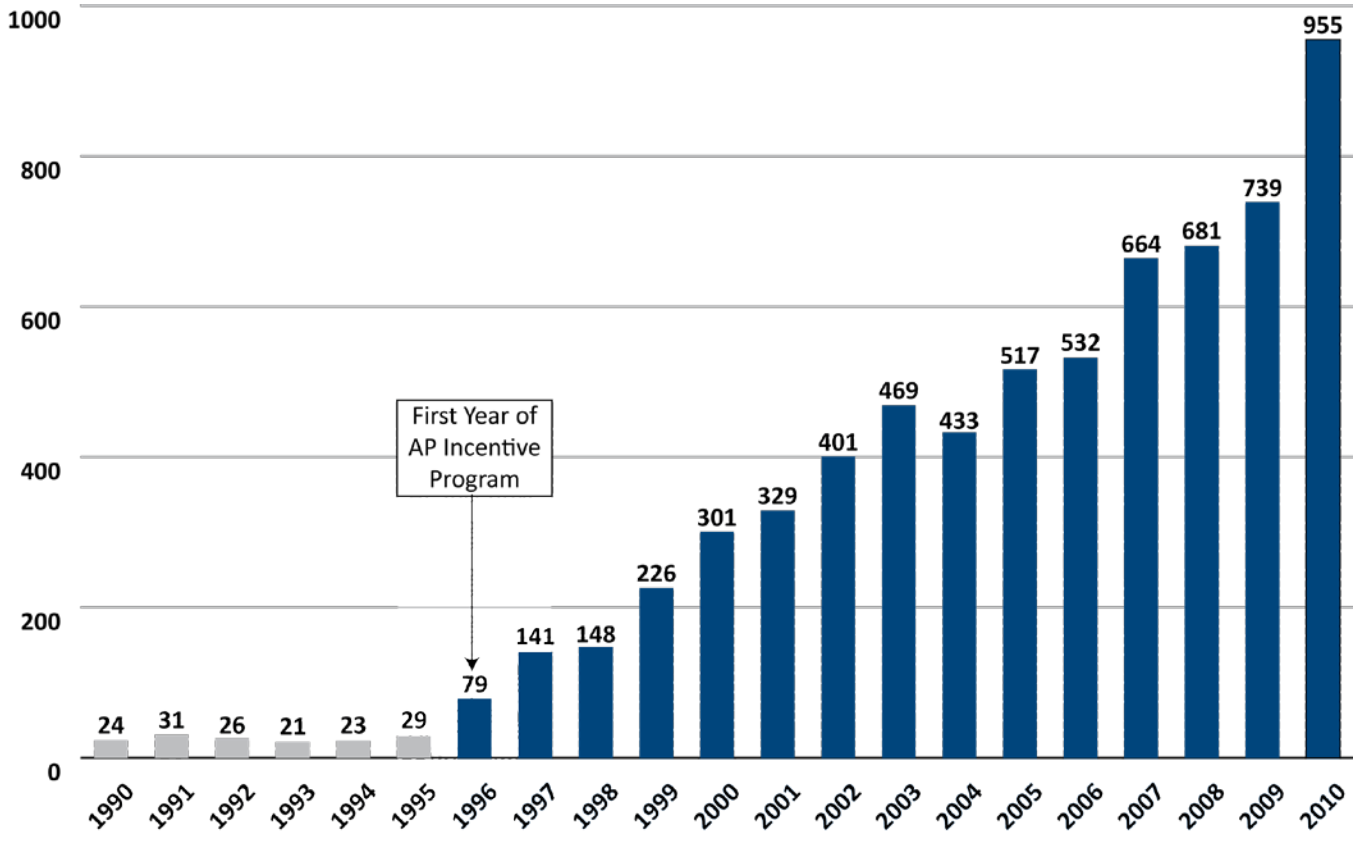
Increased African-American and Hispanic student achievement in the 10 DISD AP program schools.

AP exams **passed** by **African-American and Hispanic students** in math, science, and English in 10 Dallas ISD incentive schools

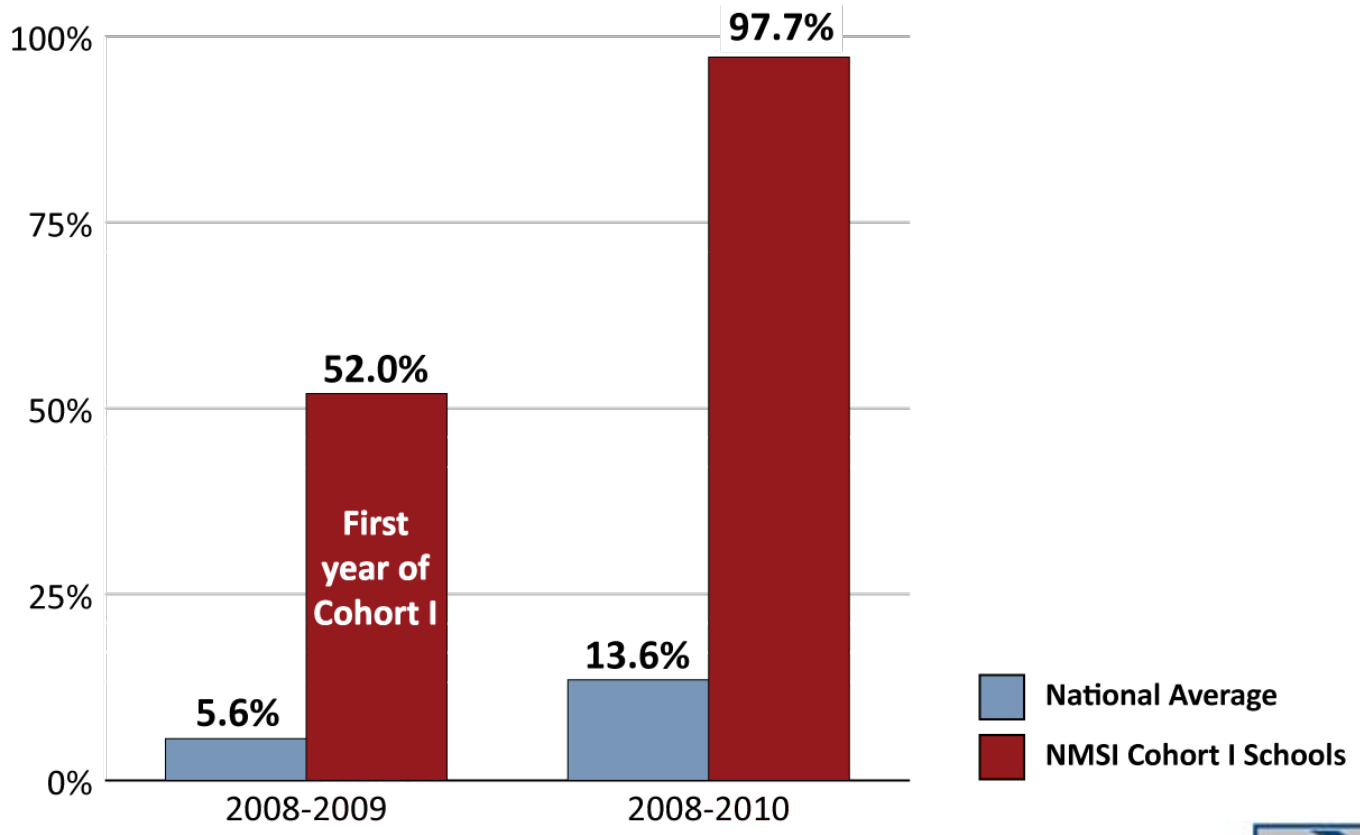


Minority passing scores are **33 times higher** in 15 years in the participating DISD schools.

Source: The College Board

APTIP Results – Cohort I

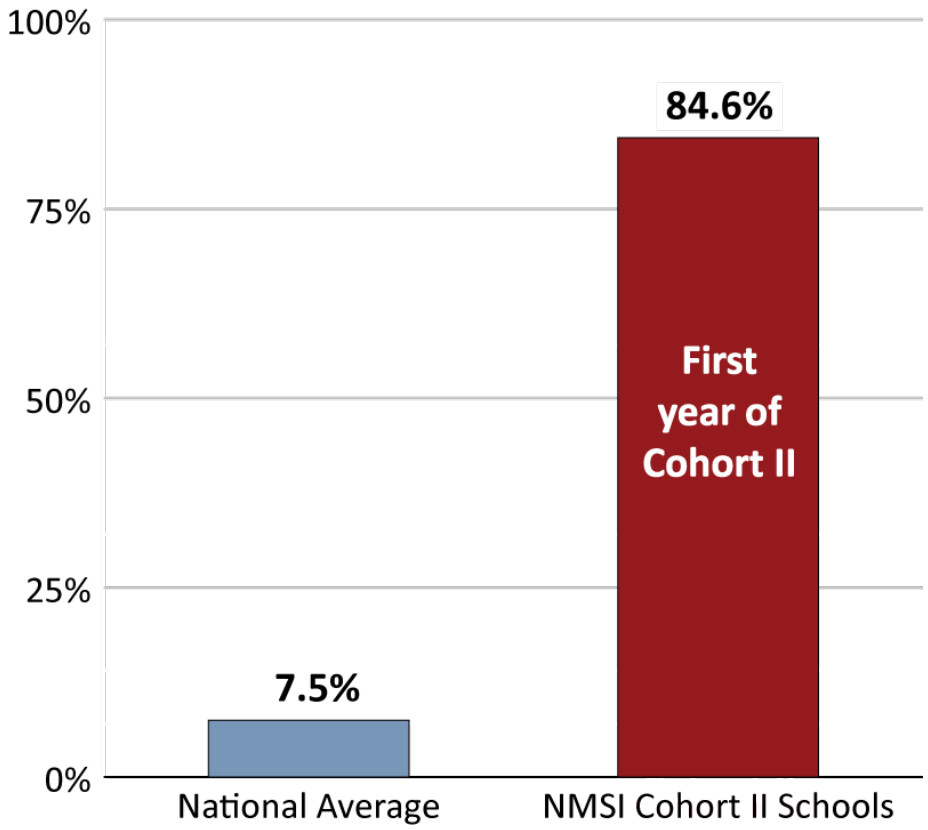
The **percent increase** in AP math, science and English exams **passed** in Cohort I of NMSI program schools is over seven times the national average.



Source: College Board. National average is for public schools only.
2009 results are for 67 Cohort I schools that participated from 2008-09. From 2009-10, there were 65 Cohort I schools that participated and they had a 53.5% increase in 2008-2009.
NMSI program schools are in Alabama, Arkansas, Connecticut, Kentucky, Massachusetts, and Virginia.

APTIP Results – Cohort II

The **percent increase** in AP math, science and English exams **passed** in Cohort II of NMSI program schools is over 11 times the national average.



Source: College Board. National average is for public schools only.
Results are for 75 APTIP Cohort II schools in Alabama, Arkansas, Connecticut, Kentucky, Massachusetts, and Virginia.

Initiative for Military Families

The Initiative for Military Families is the coming together of a great partnership by NMSI, the Military Child Education Coalition, and several corporations to support children in America's military families.

There are 160,000 young people in the U.S. who have a parent currently deployed, and at least a million children have had a parent deployed in the last eight years.

Initiative for Military Families

This public-private partnership addresses the national STEM need and helps military families by providing consistent high level STEM education in high schools serving military bases.

Through this initiative, NMSI's Advanced Placement Training and Incentive Program (APTIP) will be expanded to over 100 public high schools serving a high percentage of military families.

More can be done.

We are looking for partners to expand the Initiative for Military Families to additional public high schools. By 2011, we hope to be in 46 high schools reaching 30,000 students.

UTeach is:

A new approach to recruiting and training **strong math and science majors** for a teaching career

Cross-College Collaboration

Dedicated Master Teachers

Early, Continued, Intensive Teaching Experience

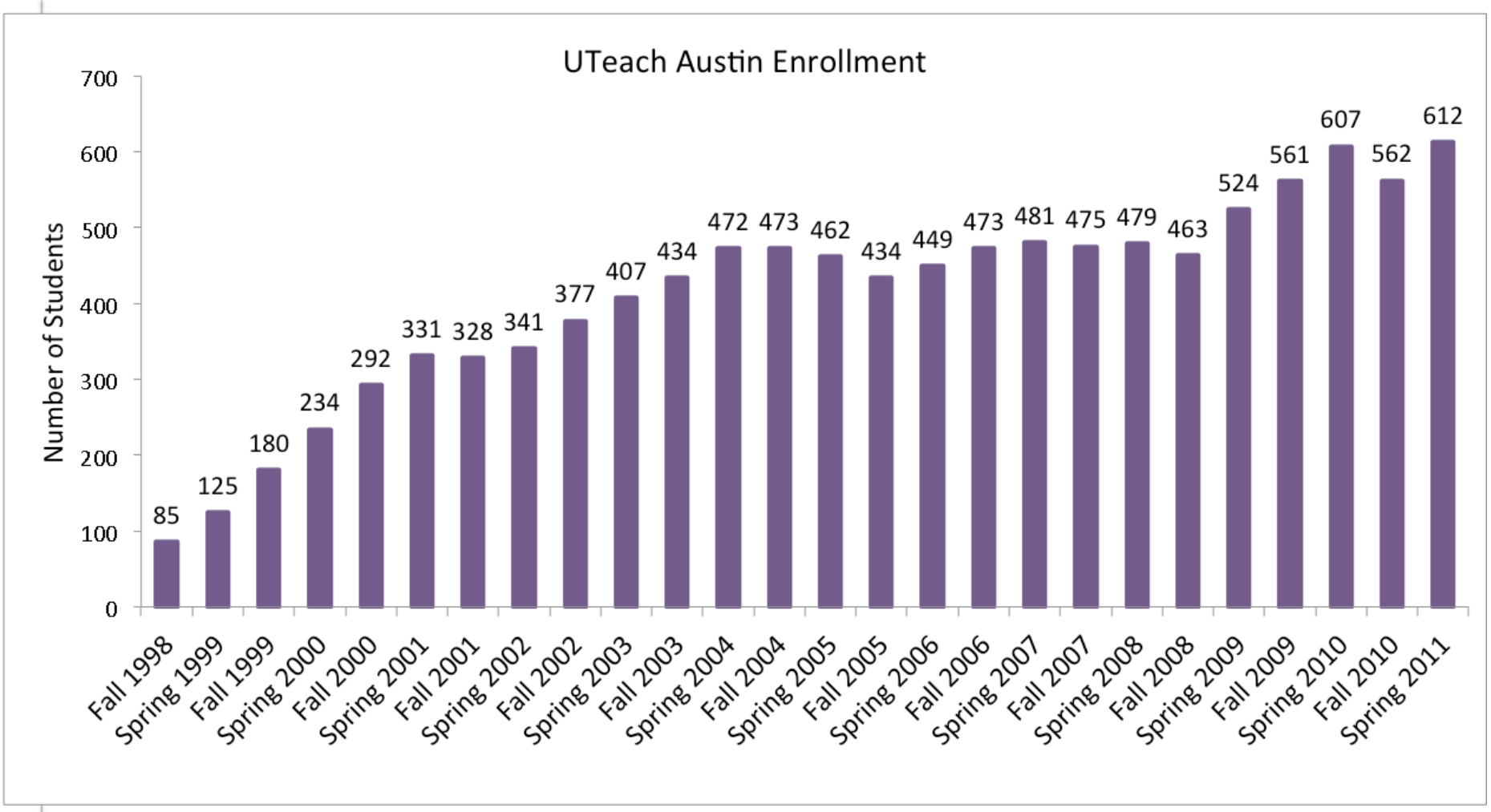
Active Student Recruitment

Compact, Flexible 4 Year Degree

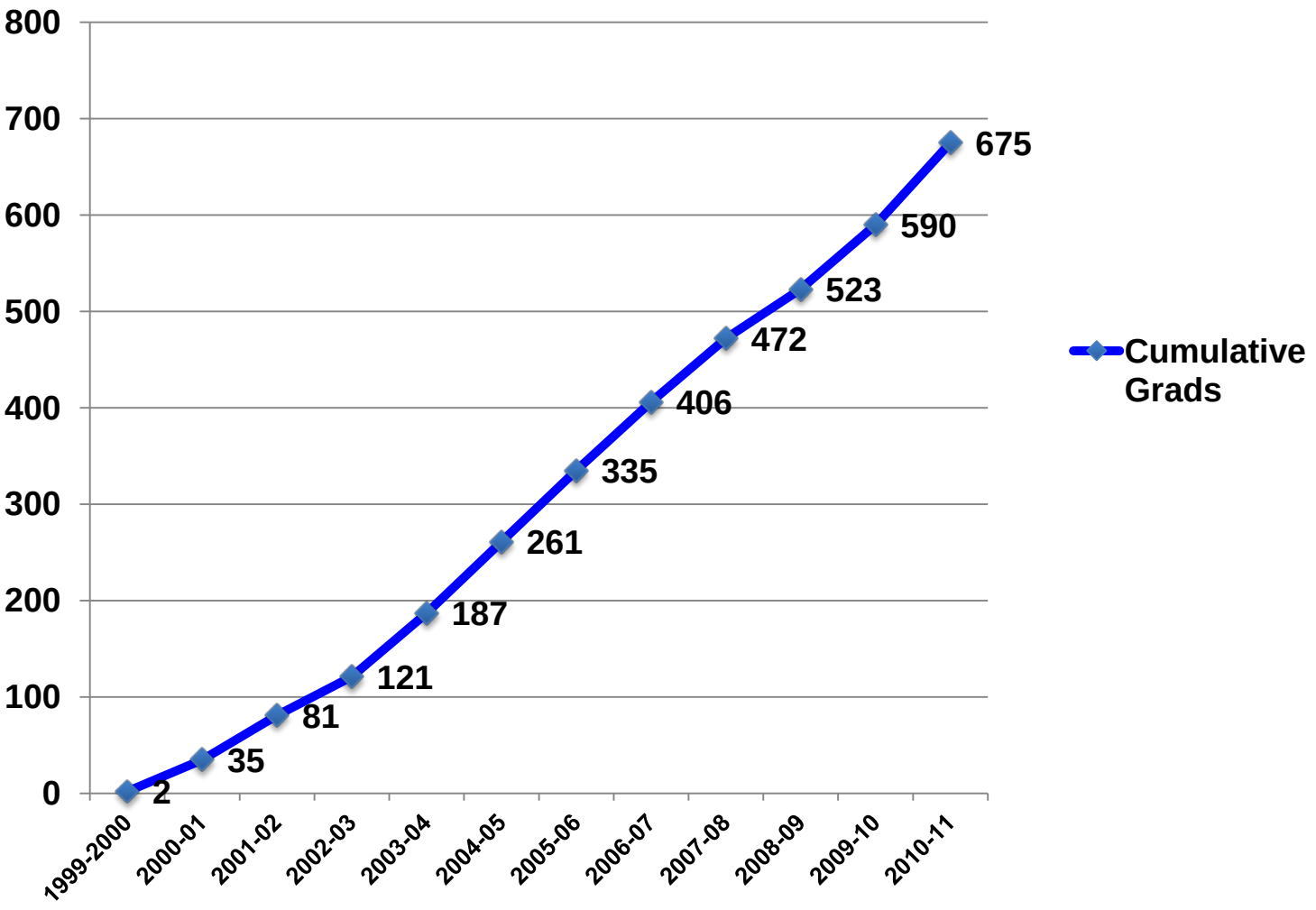
Rigorous, Research-Based Instruction

Individualized Induction Support

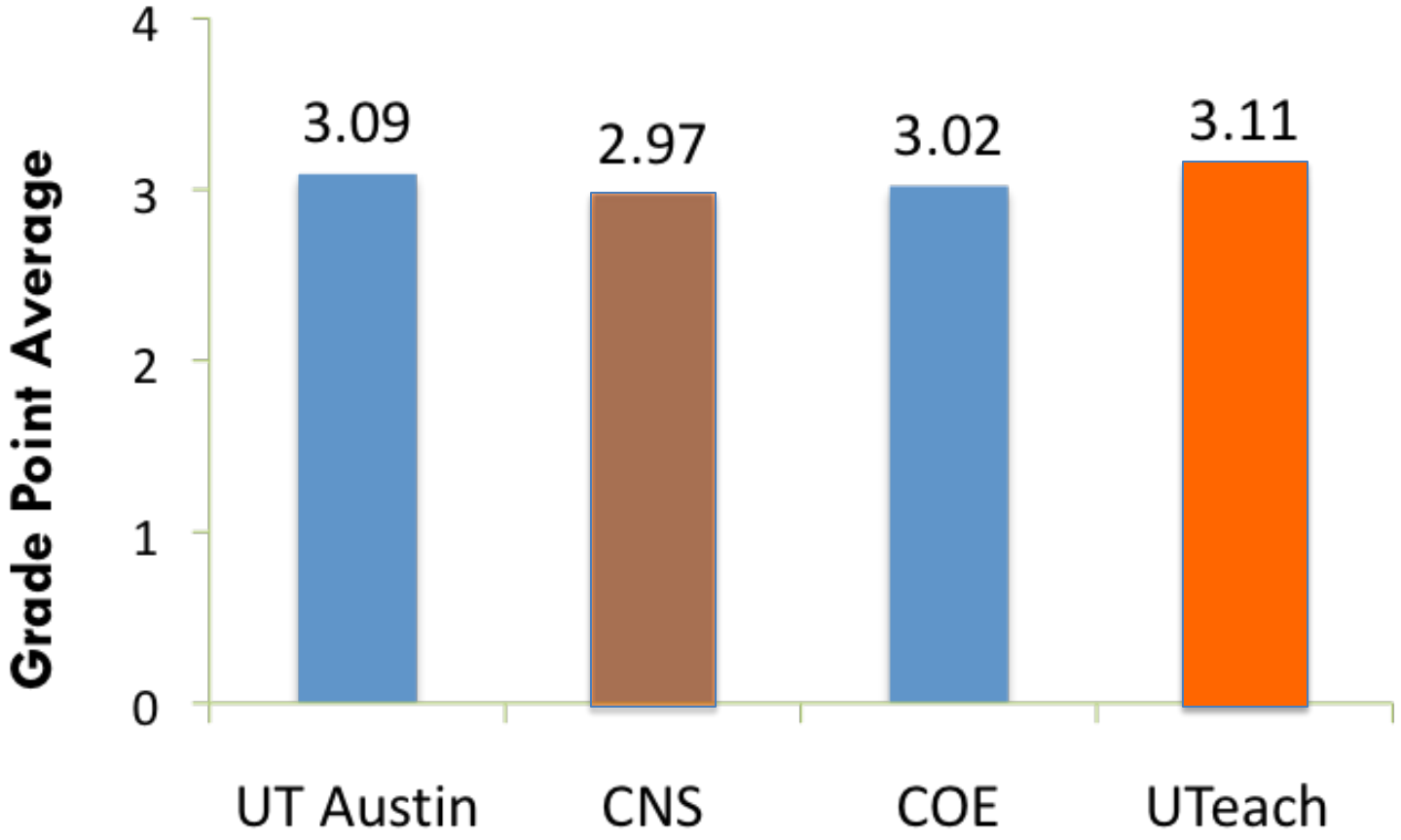
UTeach Austin Program Enrollment



UTeach Graduates Spr. 2000 - Spr. 2011

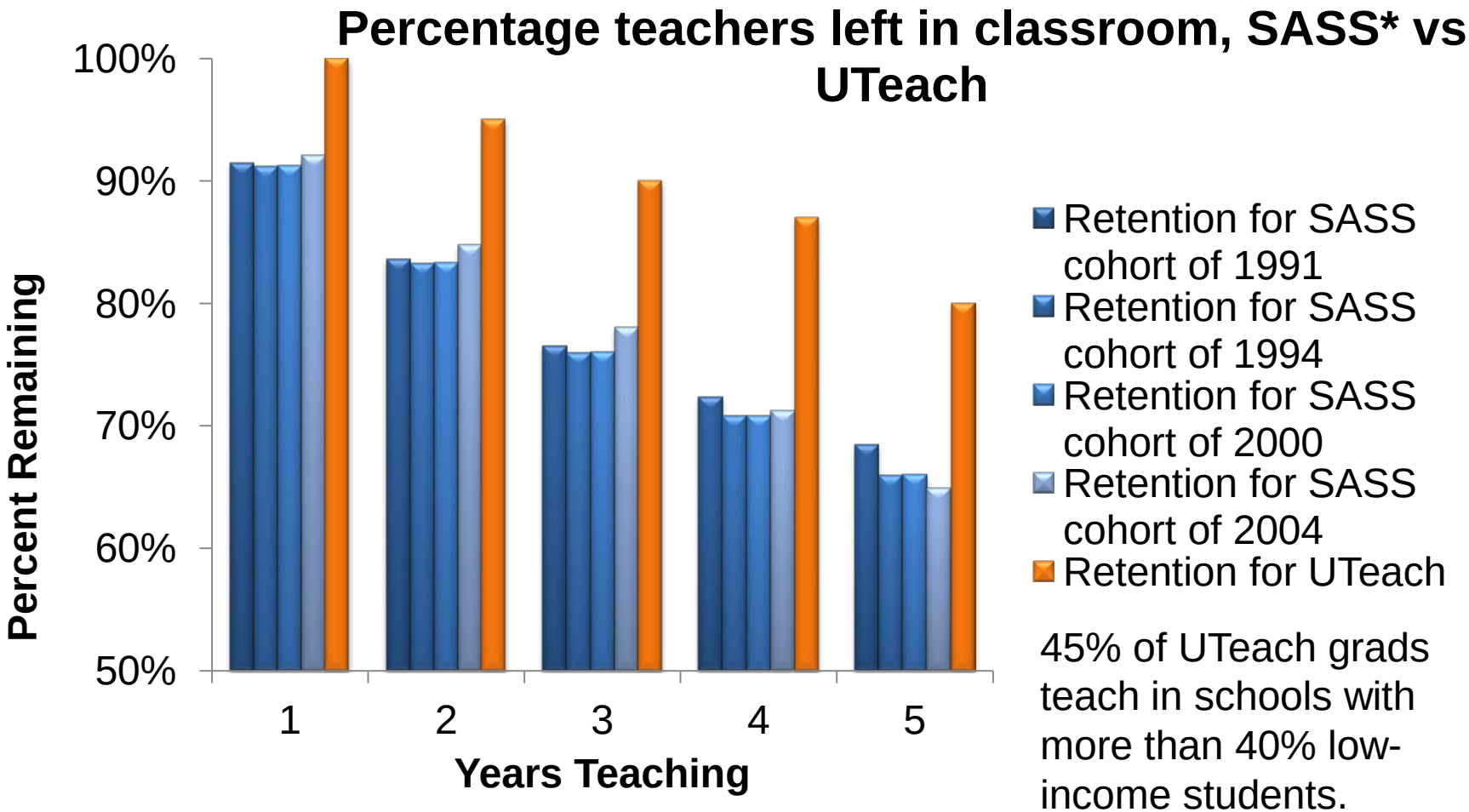


UTeach Austin GPA *Fall 2009*



UTeach Graduates: Retention in Teaching

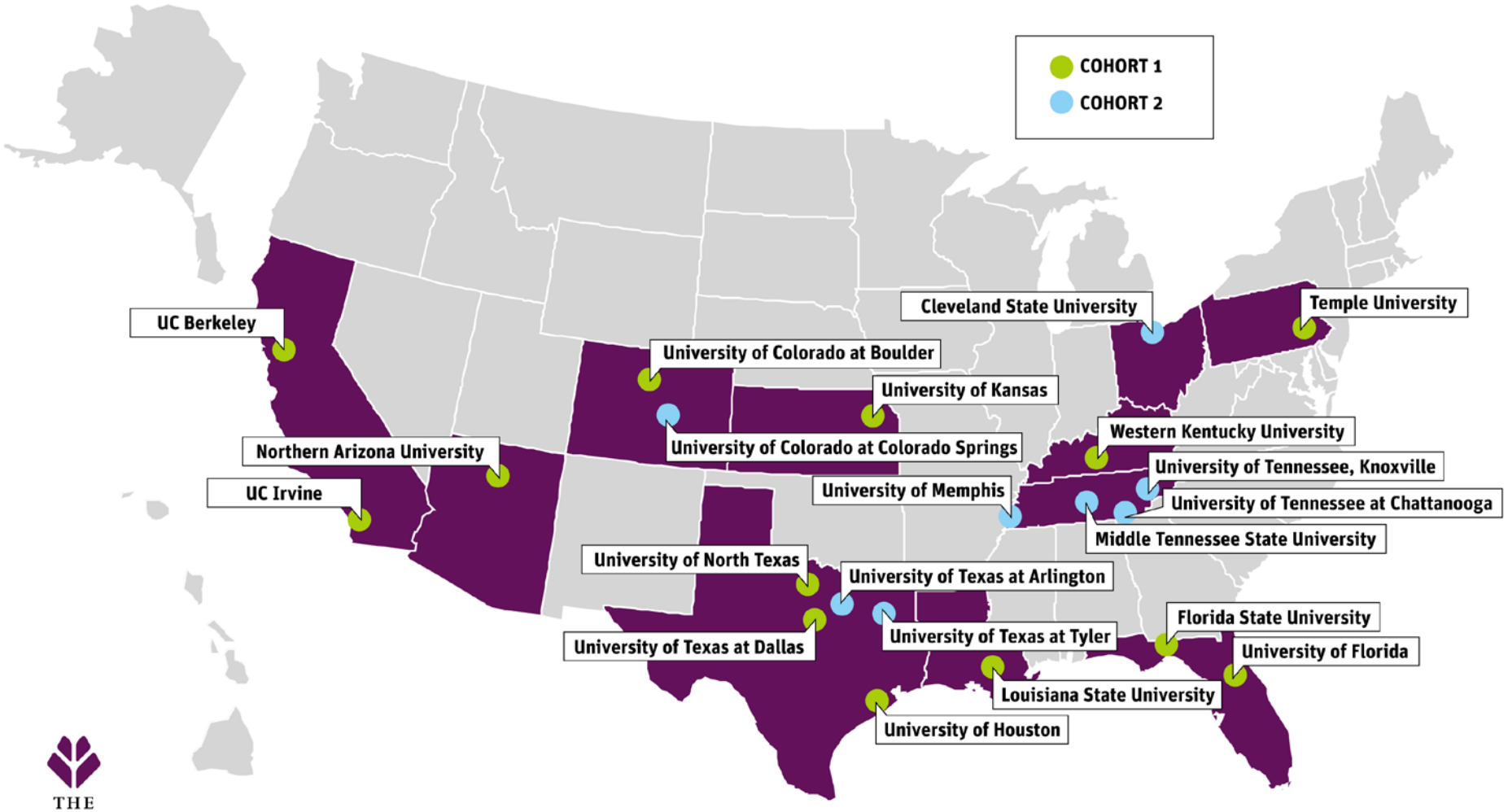
As of 2009 more than 80% still teaching after 5 years



45% of UTeach grads teach in schools with more than 40% low-income students.

*Schools and Staffing Survey

UTeach Universities

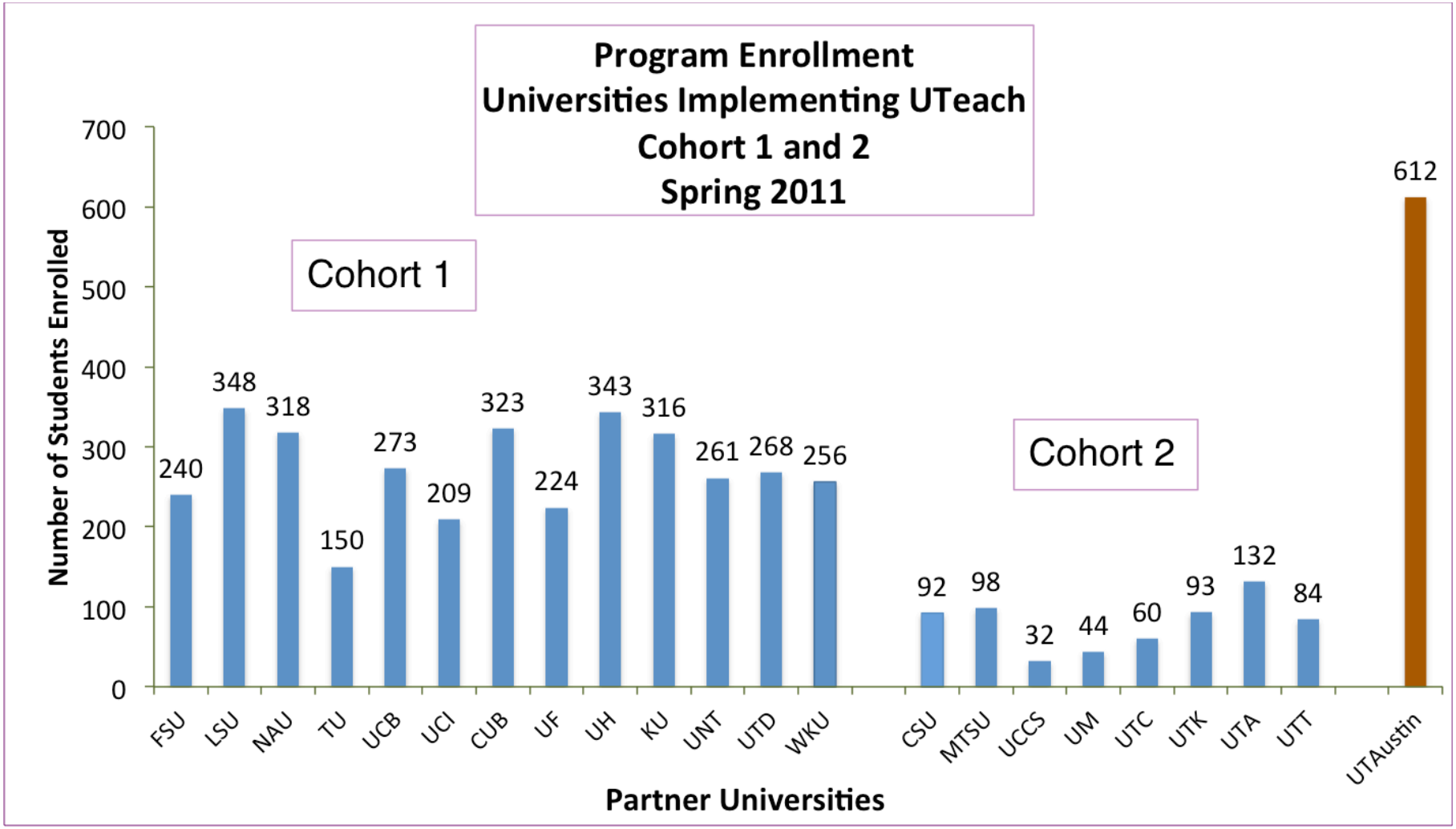


THE UTEACH INSTITUTE

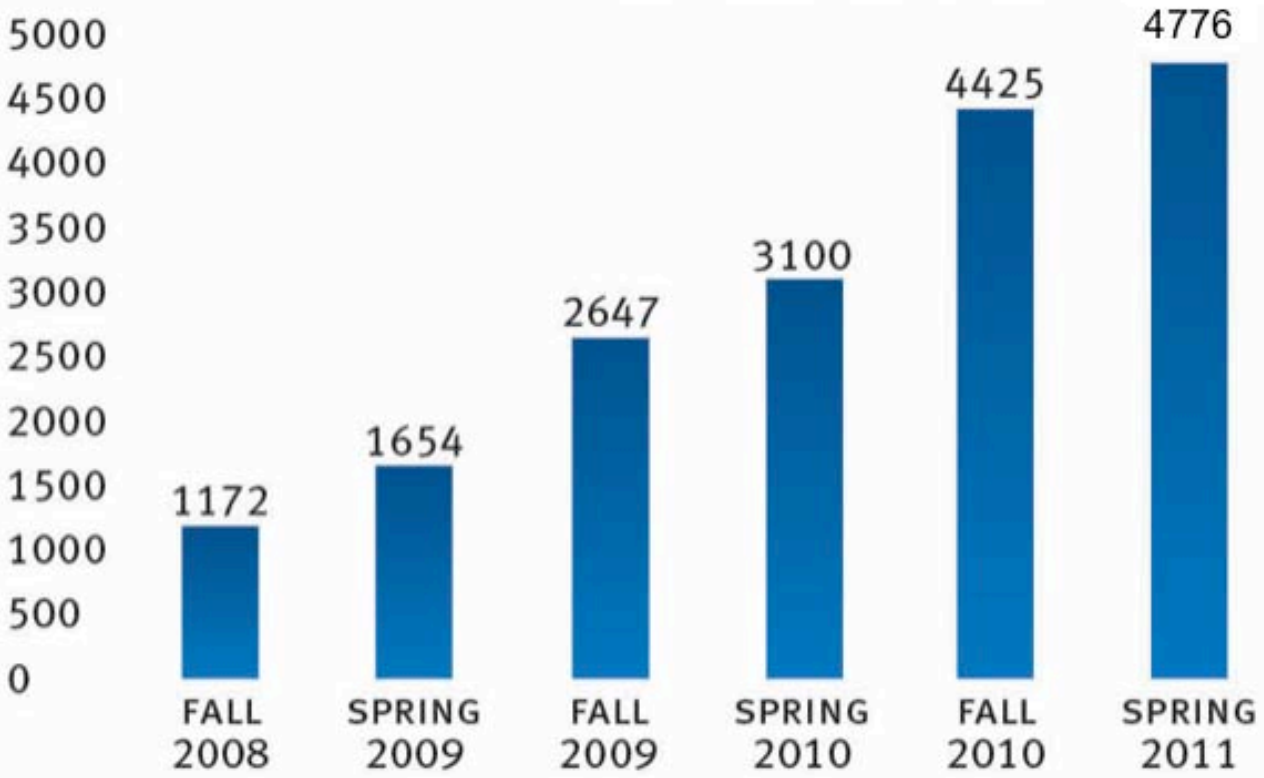
UTeach Replication Cohorts

- **Cohort 1: 13 universities**
  - started January 2008
  - Currently in Implementation Year 3
- **Cohort 2: 8 universities**
  - Started Spring 2010
  - Currently in Implementation Year 1
- **Cohort 3: 4-9 universities**
  - Starting Fall 2011 and January 2012
  - Currently in selection period

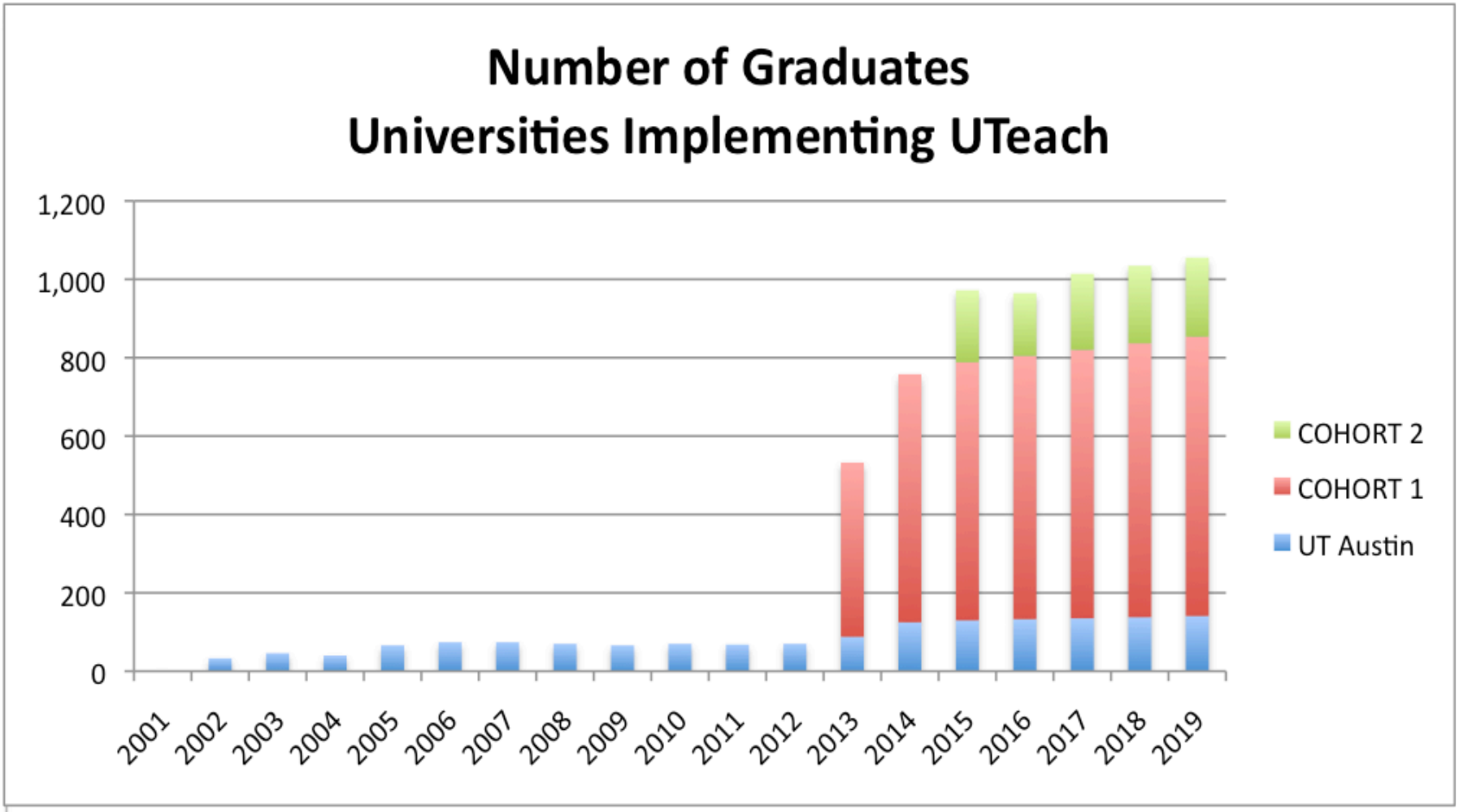
UTeach Replication Progress
Total Enrollment as of Spring 2011



GROWTH IN UTEACH ENROLLMENT NATIONAL REPLICATION



Annual Projections of Graduates from current UTeach programs



In Summary…..

- When Discovery and Teaching occur together, students are inspired, empowered and transformed.
- Teachers are transformative agents for students. They are the key to improving STEM education in this country.
- Incentives work. At risk students can excel if given the opportunity and inspiration.
- Research 1 Universities can contribute significant numbers of outstanding math and science teachers